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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/032,357	12/21/2001	Stefan Uhlenbrock	150.0111 0101	4965

26813 7590 06/14/2005

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EXAMINER

GUERRERO, MARIA F

ART UNIT PAPER NUMBER

2822

DATE MAILED: 06/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/032,357

Applicant(s)

UHLENBROCK ET AL

Examiner

Maria Guerrero

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 April 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-7,9,10,12-22,24-26 and 30-43 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2-7,9,10,12-22,24-26 and 30-43 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is in response to the Amendment and the Request for continued examination filed March 4, 2005.

Status of Claims

2. Claims 1, 8, 11, 23, 27-29 are canceled. Claims 2-7, 9-10, 12-22, 24-26, 30-43 are pending.

Continued Examination Under 37 CFR 1.114

3. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on March 4, 2005 has been entered.

Information Disclosure Statement

4. The information disclosure statements (IDS) submitted on March 4, 2005 and March 20, 2005 have been considered.

Claim Objections

5. Claims 15, 17, 26, 32, 34, 38 and 41 are objected to because of the following informalities: the claims recited: "to selectively remove the group VIII metal-containing surface relative to materials containing other metals", "to selectively remove the

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platinum-containing surface relative BPSG or TEOS". The claims do not recite any materials containing other metals or BPSG or TEOS before the planarizing step.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 2-7, 9-10, 12-22, 24-26, and 38-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beitel et al. (U.S. 2002/0017063 A1) in view of Russell et al. (U.S. 6,395,194).

Beitel et al. teaches positioning a Group VIII metal –containing surface of a semiconductor substrate to interface with a polishing surface (Abstract, page 2,

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paragraph 0019; paragraph 0024). Beitel et al. discloses the Group VIII metal being rhodium, ruthenium, iridium, osmium, palladium, and platinum (page 2, paragraph 0019). Furthermore, Beitel et al. teaches supplying an acidic planarization composition in proximity to the interface and planarizing the Group VIII metal –containing surface (Fig. 5-6, page 4, paragraph 0050-0064, paragraph 0020). Beitel et al. discloses the planarization composition comprising oxygen, ozone or chlorine (oxidizing gas) (page 2, paragraph 0020; page 3, paragraph 0036).

In addition, Beitel et al. teaches providing a silicon substrate having a patterned dielectric layer formed thereon and a Group VIII metal–containing layer formed over the patterned dielectric layer and applying the planarization method to a capacitor or barrier layer in one step to form a substantially defect-free surface (Fig. 1-6, page 3, paragraphs 0028-0034, 0037-0041; page 4, paragraphs 0046-0049).

Beitel et al. does not specifically show the polishing surface comprising a polishing pad and the planarization composition having a hardness of no greater than 9 Mohs. However, Russell et al. teaches positioning a Group VIII metal–containing surface of a substrate to interface with a polishing surface (polishing pad)(Abstract). Russell et al. discloses the Group VIII metal being iridium, platinum, palladium, ruthenium or alloy thereof (col. 3, lines 30-39, 54-57). Russell et al. teaches supplying an acidic planarization composition in proximity to the interface and planarizing the Group VIII metal–containing surface (col. 4, lines 7-35, col. 5, lines 20-60). Russell et al. teaches using a plurality of abrasive particles (Al_2O_3 , SiO_2 , CeO_2) having a hardness of no greater than about 9 Mohs (col. 5, lines 1-10).

Beitel et al. does not specifically show the selectivity ratio as claimed. However, Beitel et al. discloses selectively removing the Group VIII metal-containing surface (Fig. 5-6, page 1, paragraph 0008, page 3, paragraph 0034, 0037-0038). In addition, Russell et al. teaches selectively removing the Group VIII metal-containing surface (col. 2, lines 16-34, col. 5, lines 20-25, col. 6, lines 63-67, col. 7, lines 1-5).

Furthermore, one of ordinary skill in the art would have found it prima facie obvious at the time of the invention to select the optimized thickness merely by following the teachings of the reference because there is not evidence of criticality. In this regard, it is well settled that it is not inventive to determine (by mere routine experimentation) the optimum values of a result-effective variable, such as thickness of a layer in a semiconductor. In re Peterson, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382 (Fed. Cir, 2003)(“The normal desire of scientist or artisans to determine where in a disclosed set of percentage ranges is the optimum combination of percentages.”); In re Boesch, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980) (“Discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art.”); In re aller 220 F. 2d 454, 456, 105 USPQ 233, 235, (CCPA 1955)(“Where the general conditions of a claim are discloses in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.”).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Beitel et al. reference by specifying the polishing pad and the hardness taught by Russell et al. in order to enhance the removal rate without damaging the surface (Russell et al., col. 4, lines 48-60).

7. Claims 30-31 and 34-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beitel et al. (U.S. 2002/0017063 A1) in view of Weast et al. "CRC Handbook of Chemistry and Physics".

Beitel et al. teaches positioning a Group VIII metal –containing surface of a semiconductor substrate to interface with a polishing surface (Abstract, page 2, paragraph 0019; paragraph 0024). Beitel et al. discloses the Group VIII metal being rhodium, ruthenium, iridium, osmium, palladium, and platinum (page 2, paragraph 0019). Furthermore, Beitel et al. teaches supplying an acidic planarization composition in proximity to the interface and planarizing the Group VIII metal –containing surface (Fig. 5-6, page 4, paragraph 0050-0064, paragraph 0020). Beitel et al. discloses the planarization composition comprising oxygen, ozone or chlorine (oxidizing gas) (page 2, paragraph 0020; page 3, paragraph 0036).

In addition, Beitel et al. teaches providing a silicon substrate having a patterned dielectric layer formed thereon and a Group VIII metal–containing layer formed over the patterned dielectric layer and applying the planarization method to a capacitor or barrier layer in one step (Fig. 1-6, page 3, paragraph 0028-0034, 0037-0041; page 4, paragraph 0046-0049).

Beitel et al. is silent about adding the oxidizing agent in the form of a gas. However, a person of ordinary skill in the art would infer this recitation because Beitel et al. shows adding oxygen, ozone or chlorine and those compounds are well known as being in the form of a gas.

Beitel et al. does not specifically show the oxidizing gas having a standard reduction potential of at least about 1.4 versus a standard hydrogen electrode at 25°C. However, Beitel et al. discloses reducing the normal potential E_o of the precious metal. In addition, Weast et al. is cited as evidenced to show that the standard reduction potential is a well-known characteristic of each material (D-151 to D-154).

Beitel et al. does not specifically show the selectivity ratio as claimed. However, Beitel et al. discloses selectively removing the Group VIII metal-containing surface (Fig. 5-6, page 1, paragraph 0008, page 3, paragraph 0034, 0037-0038). In addition, Russell et al. teaches selectively removing the Group VIII metal-containing surface (col. 2, lines 16-34, col. 5, lines 20-25, col. 6, lines 63-67, col. 7, lines 1-5).

Furthermore, one of ordinary skill in the art would have found it prima facie obvious at the time of the invention to select the optimized thickness merely by following the teachings of the reference because there is not evidence of criticality. In this regard, it is well settled that it is not inventive to determine (by mere routine experimentation) the optimum values of a result-effective variable, such as thickness of a layer in a semiconductor. In re Peterson, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382 (Fed. Cir, 2003)(“The normal desire of scientist or artisans to determine where in a disclosed set of percentage ranges is the optimum combination of percentages.”); In re Boesch, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980) (“Discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art.”); In re aller 220 F. 2d 454, 456, 105 USPQ 233, 235, (CCPA 1955)(“Where the general

conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.”).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Beitel et al. reference by specifying the standard reduction potential of the oxidizing gas being at least about 1.4 using the information provided by Weast et al. and specify the selectivity ratio by routine experimentation. The modification is proper because the oxidizing gas (e.g. Cl_2) disclosed by Beitel et al. has a reduction potential at least about 1.4 (Beitel et al., page 2, paragraph 0020, 0023; Weast et al., Table 1).

8. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable Beitel et al. (U.S. 2002/0017063 A1) and Weast et al. “CRC Handbook of Chemistry and Physics” as applied to claims 30-31 and 34-37 above, and further in view of Russel et al. (U.S. 6,395,194).

Regarding claim 7, Beitel et al. does not specifically show the polishing surface comprising a polishing pad and the planarization composition having a hardness of no greater than 9 Mohs. However, Russell et al. teaches using a plurality of abrasive particles (Al_2O_3 , SiO_2 , CeO_2) having a hardness of no greater than about 9 Mohs (col. 5, lines 1-10).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Beitel et al. and Weast et al. by specifying the polishing pad and the hardness taught by Russell et al. in order to

enhance the removal rate without damaging the surface (Russell et al., col. 4, lines 48-60).

9. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable Beitel et al. (U.S. 2002/0017063 A1) and Russel et al. (U.S. 6,395,194) as applied to claims 2-6, 9-10, 12-22, 24-26, and 38-40 above, and further in view of Bruxvoort et al. (U.S. 5,958,794).

Regarding claim 14, Small et al. does not specifically show using a fixed abrasive article. However, Bruxvoort et al. teaches the use of the fixed abrasive article as conventional in the art (col. 3, lines 35-50, col. 10, lines 17-20).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Small et al. and Weast et al. by including the use of the fixed abrasive article as taught by Bruxvoort et al. in order to reduce cost (Bruxvoort et al., col. 4, lines 33-35).

10. Claims 41-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beitel et al. (U.S. 2002/0017063 A1) in view of Bruxvoort et al. (U.S. 5,958,794).

Beitel et al. teaches positioning a Group VIII metal –containing surface of a semiconductor substrate to interface with a polishing surface (Abstract, page 2, paragraph 0019; paragraph 0024). Beitel et al. discloses the Group VIII metal being rhodium, ruthenium, iridium, osmium, palladium, and platinum (page 2, paragraph 0019). Furthermore, Beitel et al. teaches supplying an acidic planarization composition in proximity to the interface and planarizing the Group VIII metal –containing surface (Fig. 5-6, page 4, paragraph 0050-0064, paragraph 0020). Beitel et al. discloses the

planarization composition comprising oxygen, ozone or chlorine (oxidizing gas) (page 2, paragraph 0020; page 3, paragraph 0036).

In addition, Beitel et al. teaches providing a silicon substrate having a patterned dielectric layer formed thereon and a Group VIII metal-containing layer formed over the patterned dielectric layer and applying the planarization method to a capacitor or barrier layer in one step (Fig. 1-6, page 3, paragraph 0028-0034, 0037-0041; page 4, paragraph 0046-0049).

Beitel et al. is silent about adding the oxidizing agent in the form of a gas. However, a person of ordinary skill in the art would infer this recitation because Beitel et al. shows adding oxygen, ozone or chlorine and those compounds are well known as being in the form of a gas.

Regarding claims 41-43, Beitel et al. does not specifically show using a fixed abrasive article. However, Bruxvoort et al. teaches the use of the fixed abrasive article as conventional in the art (col. 3, lines 35-50, col. 10, lines 17-20).

Beitel et al. does not specifically show the selectivity ratio as claimed. However, Beitel et al. discloses selectively removing the Group VIII metal-containing surface (Fig. 5-6, page 1, paragraph 0008, page 3, paragraph 0034, 0037-0038). Furthermore, one of ordinary skill in the art would have found it prima facie obvious at the time of the invention to select the optimized thickness merely by following the teachings of the reference because there is not evidence of criticality. In this regard, it is well settled that it is not inventive to determine (by mere routine experimentation) the optimum values of a result-effective variable, such as thickness of a layer in a semiconductor. In re

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Peterson, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382 (Fed. Cir, 2003)(“The normal desire of scientist or artisans to determine where in a disclosed set of percentage ranges is the optimum combination of percentages.”); In re Boesch, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980) (“Discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art.”); In re aller 220 F. 2d 454, 456, 105 USPQ 233, 235, (CCPA 1955)(“Where the general conditions of a claim are discloses in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.”)

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Beitel et al. reference by including the use of the fixed abrasive article as taught by Bruxvoort et al. in order to reduce cost (Bruxvoort et al., col. 4, lines 33-35).

11. Claims 32-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Small et al. (U.S. 2002/0111026 A1) in view of Weast et al. “CRC Handbook of Chemistry and Physics” and Bruxvoort et al. (U.S. 5,958,794).

Small et al. teaches positioning a Group VIII metal –containing surface of a semiconductor substrate to interface with a polishing surface (Abstract, page 1, paragraph 0006). Small et al. discloses the Group VIII metal being ruthenium, iridium, or platinum (page 1, paragraph 0006, page 4, paragraph 0038-0039). Furthermore, Small et al. teaches supplying an acidic planarization composition in proximity to the interface and planarizing the Group VIII metal –containing surface (page 4, paragraph 0036-0039). Small et al. discloses feeding an oxidizing gas (ozone) to the planarization

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composition (page 1, paragraph 0006,0008-0010; page 2, paragraph 0013, 0020).

Small et al. also shows employing a polishing pad (page 2, paragraph 0024, page 3, paragraph 0033). Small et al. discloses employing abrasive particles (silica, alumina, and ceria) (col. 3, paragraph 0028)

Small et al. does not specifically show the oxidizing gas having a standard reduction potential of at least about 1.4 versus a standard hydrogen electrode at 25°C. However, Weast et al. is cited as evidenced to show that the standard reduction potential is a well-known characteristic of each material (D-151 to D-154).

Regarding the specific variables claimed i.e., selectivity ratio, one of ordinary skill in the art would have found it prima facie obvious at the time of the invention to select the optimized thickness merely by following the teachings of the reference because there is not evidence of criticality. In this regard, it is well settled that it is not inventive to determine (by mere routine experimentation) the optimum values of a result-effective variable, such as thickness of a layer in a semiconductor. In re Peterson, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382 (Fed. Cir, 2003) ("The normal desire of scientist or artisans to determine where in a disclosed set of percentage ranges is the optimum combination of percentages."); In re Boesch, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980) ("Discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art."); In re Aller 220 F. 2d 454, 456, 105 USPQ 233, 235, (CCPA 1955) ("Where the general conditions of a claim are discloses in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.")

Small et al. does not specifically show using a fixed abrasive article. However, Bruxvoort et al. teaches the use of the fixed abrasive article as conventional in the art (col. 3, lines 35-50, col. 10, lines 17-20).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Small et al. reference by specifying the standard reduction potential of the oxidizing gas being at least about 1.4 using the information provided by Weast et al. and specify the selectivity ratio by routine experimentation. The modification is proper because the oxidizing gas (e.g. ozone) disclosed by Small et al. has a reduction potential at least about 1.4 (Weast et al., Table 1).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Small et al. and Weast et al. by including the use of the fixed abrasive article as taught by Bruxvoort et al. in order to reduce cost (Bruxvoort et al., col. 4, lines 33-35).

Response to Arguments

12. Applicant's arguments with respect to claims 2-7, 9-10, 12-22, 24-26, and 30-43 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maria Guerrero whose telephone number is 571-272-1837.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 571-272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

June 9, 2005

Maria Guerrero
MARIA F. GUERRERO
PRIMARY EXAMINER